

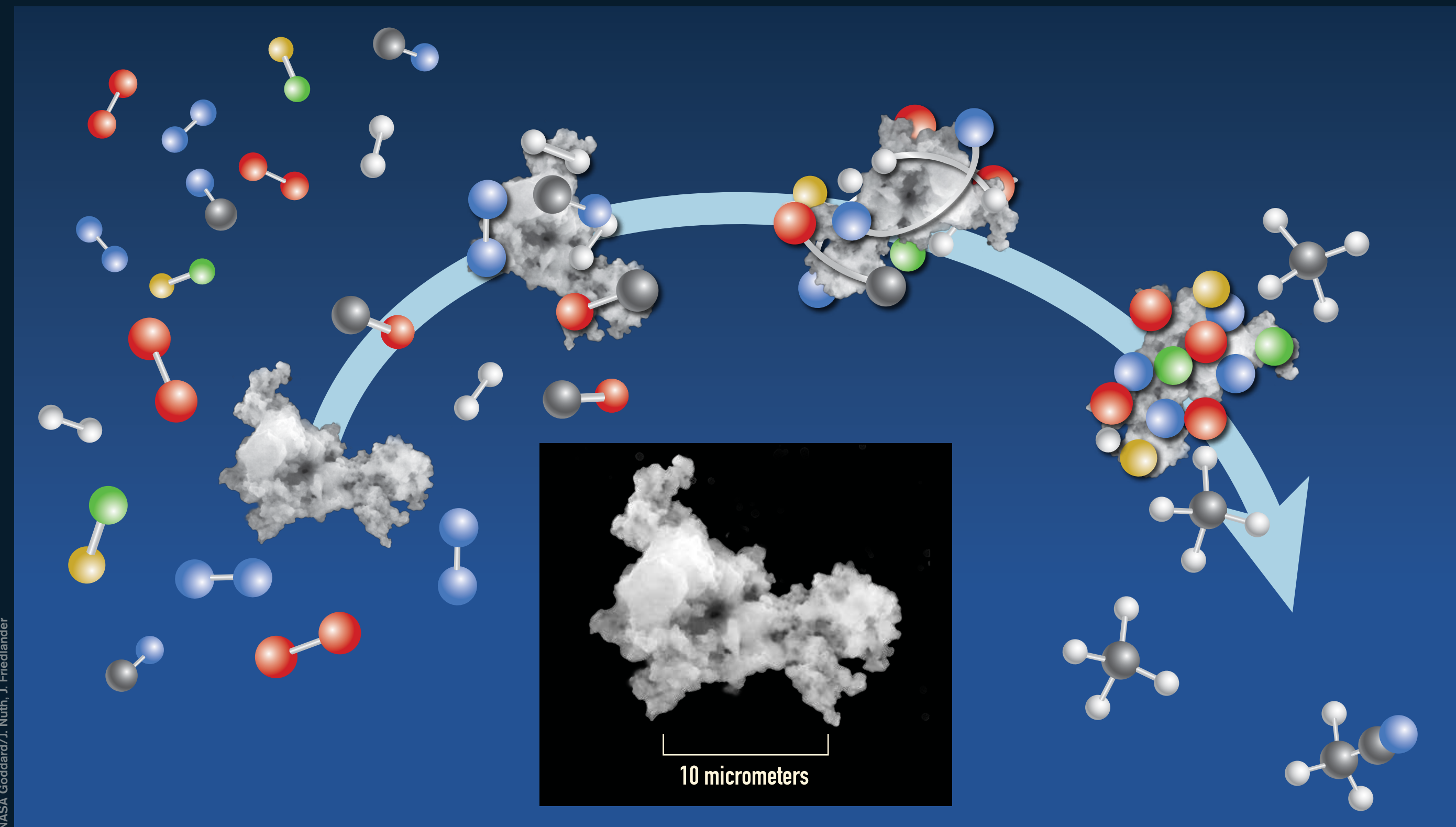
STATION 03 > Goddard Initiatives

The Importance of Space Dust

In the hot inner region of a protostellar disk, countless tiny dust grains convert gases stuck to their surfaces into simple organic, or carbon-containing,

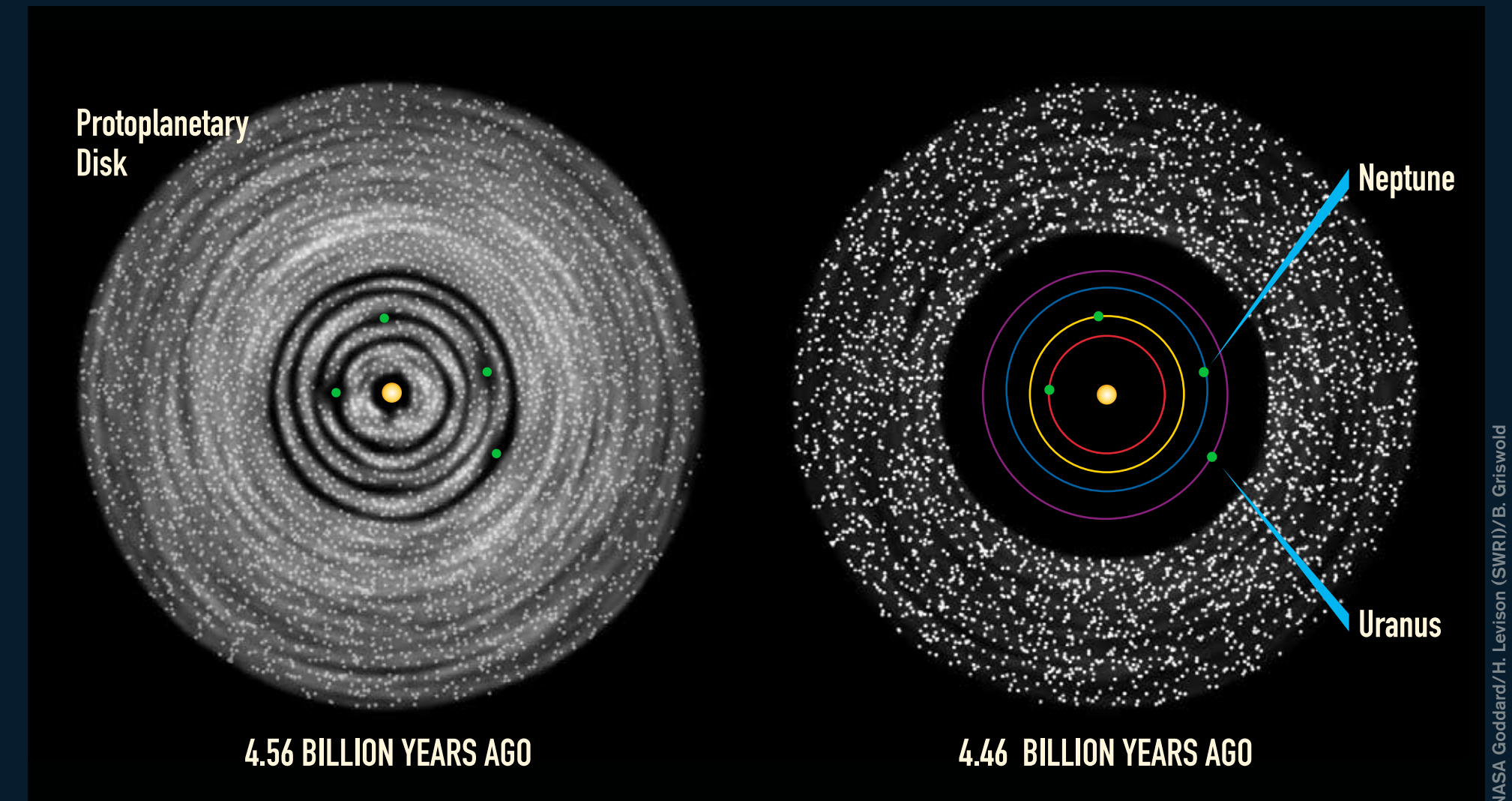
compounds. Later reactions will convert these compounds into more complex molecules, possibly including ingredients of the “prebiotic soup” that led to life

on Earth. The “cosmic cycle” of this production is illustrated below.



DUST GRAINS KICK-START CHEMICAL REACTIONS: Dust grains in space often serve as tiny test tubes where crucial chemical reactions take place. Goddard scientists investigate these reactions using heated grains of astrophysical “smokes”. Center: A tiny interplanetary dust grain collected in Earth’s stratosphere.

A Planetary System is Born



DUST IS CLEARED AS PLANETS FORM: The protoplanetary disk phase ends with the formation of planets and clearing of gas from the disk. Gaps appear in the disk as the planets grow, here illustrated by the giant gas planets (left). After planetary growth ended, the Solar System could have been configured with an outer disk of icy bodies and with Uranus as the outermost giant planet (above, right). Today, Neptune is outermost.

DID YOU KNOW?

The same chemical reactions that made complex organic chemicals in the inner solar nebula can be used to convert coal into gasoline and nitrogen from the air into fertilizer here on Earth.